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A PAPER, by Mr. James Epps, was read, containing "Tables for readily ascertaining the azimuthal deviation of a transit instrument from the meridian, by observed transits over the vertical it describes; with the method of reducing these observations to the meridian, and of determining the exact state of the clock in respect to sidereal time."

The author, having for some years been engaged in observing transits for the purpose of a scrupulous determination of time, was indispensably led to consider of the readiest method of keeping the instrument in the meridian, and *of correcting his observations for it's occasional deviations.* After trying several methods, no one was found so generally applicable as that recommended by Delambre, and dependent upon the observations of two well-known stars, passing the meridian at nearly the same time, and differing considerably in north polar distance. It is assumed that the axis of the instrument has been carefully levelled, and the error of collimation corrected, *i. e.* that the middle wire of the telescope describes a correct vertical circle. It is also supposed, that the clock is either going sidereal time, or that, from it's known rate, any observed interval can be reduced to sidereal time. Mr. Epps then investigates the form of the correction, and concludes, that if z be the deviation of the vertical from the meridian in seconds of time; α, the N.P.D. of the star; λ, the co-latitude of the place of observation, the correction to be applied to the observed time of transit is $\pm z.\frac{\sin(\alpha-\lambda)}{\sin\alpha}$ according as the deviation is to the east, or west, of the south horizon. Tables are given of $\frac{\sin(\alpha-\lambda)}{\sin\alpha}$ for every degree of N. P. D. from 15° to 130°, and for every 10′ of N. latitude from 51° to 53°. By an additional column, containing the variation of this factor for 2°, this table can be continued with equal accuracy from 49° to 55° N. latitude. Separate tables are constructed for α, β, δ, Ursæ Minoris, both above and below the pole. Several examples follow, in which the use of these numbers in ascertaining the state of the instrument and the true error of the clock are very clearly shewn. It is further recommended to observe several couplets of stars, and to take the mean result. If the instrument be reversed after half the observations are made, the determination of the absolute time will be still more accurate.

There was also read Part I. of a communication from Captain P. W. Grant, of the Bengal Survey Department, on what he considers "some new and improved methods of finding the longitude."

Having been deputed to Ava during the late war to make astronomical observations for correcting its geography, Captain Grant was led to reflect on the practicability of making the observations with all necessary correctness by means of portable instruments, and dispensing with the use of such as, either require more time for adjusting than, in the circumstances of the country, could well be spared, or, from their size, could be conveniently transported from one station to another. Of the methods in general use for finding the longitude, Captain Grant adverts especially to three,—that by the eclipses of Jupiter's satellites;—the method of lunar distances;—and that depending on the observed time of the moon's meridian transit. Neither of the former he considers as capable of affording results sufficiently accurate for his purpose, and the latter requires the use of a transit instrument, which, if possible, he wished to avoid.

The method of solving the problem which he proposes in this paper requires in practice only a sextant and an artificial horizon. It is simply to find the moon's right ascension, by applying to a known star's right ascension the difference of the meridian distance of the moon and the sun, or two stars, when their altitudes are equal on the same side of the meridian, allowance being made for the interval between the observations. The times being found from the observations at which the moon and a star have the same *true* altitude, the horary distances of both objects from the meridian are computed from the latitude of the place of observation, and the altitudes and polar distances of the objects. Then putting δ for the difference of these horary angles, R for the moon's right ascension, ϱ for the stars, and D for the interval, in sidereal time, between the times at which the true altitudes of the objects are the same, the moon's right ascension is deduced from this formula:

$$R = \varrho \pm D \pm \delta$$

The *upper* or *lower* sign of D being used according as the star's altitude is observed before or after that of the moon, and the *upper* or *lower* sign of δ according as the moon is east or west of the star. The right ascension of the moon being thus obtained, the corresponding Greenwich time is found by interpolation from her right ascension for noon and midnight, as given in the Nautical Almanack; and this time being compared with that at the place of observation when the altitude of the moon was observed, the longitude is determined. Captain Grant exemplifies the method by some practical examples from his own observations, worked out at length; and concludes with a printed form for arranging the calculations.

The following extract from a letter addressed to J. F. W. Herschel, Esq., President, by the Astronomer Royal, was next read:—

Royal Observatory, Greenwich, November 5th, 1828.

"The comet was, I believe, seen, for the first time at this place, last night. You probably, with your powerful telescope, may already have seen it. Should that not be the case, you will be glad to hear of its appearance. Mr. Richardson first perceived it with a 30-inch telescope, of large aperture, applied to the western equatorial."

Nov. 4th. { Æ 22h 47m 49s.
Mean time, 11h 13m 22s { D 23° 39′ 27″ N.

Lastly, There was read the following communication from James South, Esq.:—

"*Thursday Evening, October 30th.*—Right ascension, 23h 13m; declin. + 25° 43′: a luminous patch in the field of the transit instrument, but so extremely faint, as to be invisible, unless the eye be directed to another part of the field. The five-feet equatorial exhibits it with difficulty; but the night is hazy. Its place accords so closely with the calculated place of Encke's comet, and its appearance so reminds me of that which Encke's comet put on, when I first detected it at Passy, in the summer of 1825, that I consider it no other than that body. I communicated my sentiments the following morning to Mr. Troughton, and (as I believe) to Mr. Baily also.

"*Monday, November 3rd.*—Directed the equatorial to R. A. 23h 13m; declin. + 25° 43′; but the nebulous spot seen on the 30th cannot be perceived. The night, however, is perhaps a little hazy. About half an hour subsequent to this, the sky became beautifully clear; and on placing the equatorial on the spot which Encke's comet should occupy, according to his ephemeris, a nebulous spot was seen exactly in the centre of the field, of the same figure as that perceived on the 30th. It was, however, now so distinct, as to be seen by Captain Beaufort and myself without difficulty. Lord Ashley, Mr. Baily, and Professor Moll, were present at the time. Clouds, however, suddenly supervened, which prevented its meridian passage being observed: nor was it visible during the more advanced period of the night.

"*Tuesday, November 4th.*—Right ascension, 22h 49m; declin. + 23° 48′; three stars seen in the field of the equatorial, two of them forming a double star of the 6th class, of the 9 and 9½ magnitudes (we will call them A and B), angle of position, about 70° south following: distant, and at an angle of 20° or 30°, with the larger of the two first-mentioned stars, is another star of the 10th magnitude, which we will denominate C. About a minute north of A, and nearly in a line with its companion B, and pre-

ceding A three seconds of time, is a faint nebulous spot. The equatorial was now placed at R.A. $23^h\ 13^m$; declin. $+\ 25°\ 43'$; and at R.A. $22^h\ 53^m$; declin. $+\ 24°\ 14'$; but no nebula can be detected in either place, although the night is remarkably fine. By the transit instrument, the right ascension of the presumed comet was $22^h\ 48^m\ 50^s$. At $1^h\ 15^m$ sidereal time, it had materially altered its position relatively to the neighbouring stars, being considerably to the south of the star A, and nearer to C than to A. It is therefore, beyond all doubt, a comet; and as its place coincides so exactly with the calculated place of Encke's comet, it can be no other than *it*.

"*Wednesday, November 5th.*—This evening, at Slough, the comet was seen in the 7-feet, the 10-feet, and 20-feet reflectors, by Mr. Herschel, Lord Ashley, Dr. Wallich, and myself; since which time I have frequently seen it with the 5-feet equatorial; and on Wednesday night last, the moon being seven days old, and but a few degrees distant, it was still visible, and was seen by two of my visitors and myself.

J. MOYES, TOOK'S COURT, CHANCERY LANE.